

## Generator Troubleshooting and Maintenance

This 5 day course will teach participants the electrical operation of three phase AC generators and how to maintain, test and troubleshoot them.

It is 50% hands on and is customized to the unique need of each client and their own equipment.

Our instructors all have 35+ years of experience with industrial generation and control.

### **Who Should Attend:**

Anyone responsible for generators and their management

### **You Will Be Able To:**

Safely, efficiently and effectively maintain generators

## **ALTERNATORS (SYNCHRONOUS GENERATORS)**

*Objective:*

### **SUBTOPICS:**

- Configurations
- Single and Three Phase Armatures
- Connections for Single and Three Phase Alternators
- Frequency and Frequency Regulation
- Voltage and Voltage Regulation
- Temperature and Environmental Considerations of Alternators
- Alternator Loading Considerations
- Considerations of Polyphase Induction Motor Starting on Engine-Generator Sets
- Application Considerations of Synchronous AC Generators to Nonlinear Electrical Loads

## **GENERATOR EXCITATION**

*Objective:*

### **SUBTOPICS:**

- Rotating Field
- DC Excitation
- Brushless Excitation

## **AUTOMATIC VOLTAGE REGULATORS**

*Objective:*

### **SUBTOPICS:**

- Generator Characteristics
- Manual Excitation Control
- Automatic Excitation Control
- Voltage Regulator Stability
- Types Of Sensing Circuits
- Power Input Circuit
- Frequency Compensation
- Fault Current Support – Excitation Support Systems
- Digital Excitation Technology
- Parallel Operation
- Power System Stabilizers

## **ENGINE PROTECTIVE CONTROLS**

*Objective:*

### **SUBTOPICS:**

- Basic Components
- Lubrication
- Cooling
- Overspeed
- Miscellaneous
- Alarms
- Shutdown
- Generator Instrumentation

## **GENERATOR SWITCHGEAR**

*Objective:*

### **SUBTOPICS:**

- Circuit Breaker Components
- Accessories and Modifications
- How to Select a Circuit Breaker
- Voltage Classifications
- Switchgear Types
- Applications

## **LOAD BANKS**

*Objective:*

### **SUBTOPICS:**

- Load Bank Applications
- Portable Load Banks
- Permanent Load Banks
- Radiator Load Banks
- Medium Voltage Load Banks
- Load Bank Controls

## **AUTOMATIC TRANSFER SWITCHES**

*Objective:*

### **SUBTOPICS:**

- Supplying Emergency Power
- Transferring Power

- Manual Devices
- Automatic Devices
- Controlling Automatic Transfer Switches
- Transferring Motor Loads with Automatic Transfer Switches
- Ground-Fault Protection
- Open Transition Transfer Switches
- Closed Transition Transfer Switches
- Automatic Transfer Systems
- Maintaining Emergency Power
- Transfer Systems
- System Faults
- Motor Load Considerations
- Testing
- Maintenance

## **PARALLELING GENERATORS**

*Objective:*

### **SUBTOPICS:**

- Electric Power System
- Parallel Operation of Generators
- The Control Strategy
- Synchronization
- Protective Strategy
- Failure Modes
- The Protective Relying Scheme
- Islanding
- Suitable Protective Schemes
- Dedicated Interconnect Circuit
- Medium Voltage Interconnect

## **CONTROL & MONITORING SYSTEMS**

*Objective:*

### **SUBTOPICS:**

- Controls for On-Site Power Applications
- What Is A PLC?
- Components in PLC Control Systems
- PLC Operation
- System Architecture
- Redundant PLC Systems
- Data in PLC Memory
- PLC Software
- Operational Limits Of PLC Control Systems
- Testing PLC Control Systems
- Monitoring Systems
- Supervisory Control and Data Acquisition (SCADA) Systems
- Case Study: Water Treatment Plant
- Power System

## **TROUBLESHOOTING ON-SITE POWER GENERATION SYSTEMS**

*Objective:*

### **SUBTOPICS:**

- Applicability
- The Common Troubleshooting Process
- The Formal Troubleshooting Process
- Case Studies
- Conclusion
- Practical Troubleshooting Tools